

GROUNDWATER

Results for 2004

The following groundwater results summarize only those monitoring activities conducted to demonstrate compliance with Wastewater Land Application Permits. Groundwater monitoring is conducted at the following Wastewater Land Application Permitted locations:

- Idaho Nuclear Technology Engineering Center (INTEC) New Percolation Ponds
- INTEC Sewage Treatment Plant
- Test Area North/Technical Support Facility Sewage Treatment Plant.

The sampling locations, frequency, and analyses to be performed for all Wastewater Land Application Permit groundwater monitoring activities were negotiated with the State of Idaho during the approval stages of the respective Wastewater Land Application Permits.

Locations

Sampling locations (i.e., monitoring wells) were selected based on the hydrogeology of the area to best determine the impact to the subsurface and the Snake River Plain Aquifer by liquid effluent discharges. The individual Wastewater Land Application Permits identify specific monitoring wells as compliance points and specific wells as background aquifer or perched water monitoring points.

Frequency

Sampling occurs semiannually, in April and October, as required by the permits.

Analytical Parameters

Analytical parameters were chosen to match the contaminants commonly found in the liquid effluent discharge to the respective ponds and trenches. The Wastewater Land Application Permits list specific required parameters to monitor for in each of these wells. Typically, the compliance point monitoring wells are required to meet the primary and secondary constituent standards (IDAPA 58.01.11, Groundwater Quality Rule) for applicable parameters. However, for the INTEC New Percolation Ponds aquifer monitoring wells, the preoperational concentrations in the upgradient well (ICPP-MON-A-167) are considered the natural background level (IDAPA 58.01.11.200.03), and are used for compliance with the permit.

2004 RESULTS SUMMARY

This section covers 2004 WLAP groundwater data related to the required April and October 2004 sampling events.

INTEC New Percolation Ponds

Aquifer wells ICPP-MON-A-165 and ICPP-MON-A-166, and perched water wells ICPP-MON-V-200 and ICPP-MON-V-212 are permit compliance points. Aquifer well ICPP-MON-A-167 and perched water well ICPP-MON-V-191 are listed in the permit as upgradient, noncompliance points. All permit-required samples are taken as unfiltered samples. Perched water well ICPP-MON-V-191 was dry during both the April and October 2004 sampling events. ICPP-MON-V-191 is expected to remain dry until the Big Lost River flows sufficiently to recharge the perched water at this well.

For aquifer wells ICPP-MON-A-165, ICPP-MON-A-166, and ICPP-MON-A-167, the permit-required parameters remained below the preoperational background concentrations.

The majority of the permit-required parameters remained below their respective primary constituent standards or secondary constituent standards during the 2004 permit year for perched water wells ICPP-MON-V-200 and ICPP-MON-V-212. No primary constituent standards were exceeded in either of these two wells. However, exceedances of secondary constituent standards were reported for three metals (aluminum, iron, and manganese). Aluminum, iron, and manganese concentrations in perched water well ICPP-MON-V-200 and the iron concentration in perched water well ICPP-MON-V-212 in October 2004 exceeded the associated groundwater quality standards.

All of the wells associated with the INTEC New Percolation Ponds are relatively new wells and were completed in 2002 prior to startup of the New Percolation Ponds. Higher than expected concentrations of aluminum, iron, and/or manganese have been detected in the wells associated with the New Percolation Ponds, including the upgradient well (ICPP-MON-A-167), which should not be influenced by the wastewater discharged to the ponds. These high concentrations were detected in preoperational samples taken from

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aquifer wells ICPP-MON-A-167 and ICPP-MON-A-166 prior to wastewater being discharged to the New Percolation Ponds, and they have persisted since the permit was issued and since the New Percolation Ponds began receiving wastewater

To determine the source of the high metals, additional filtered (0.45 micron) samples were collected from wells ICPP-MON-A-166, ICPP-MON-A-167, and ICPP-MON-V-200. In April and October 2004, the aluminum, iron, and manganese concentrations in all three wells were significantly less in the filtered samples and were all below the applicable secondary constituent standards. Removal of the metals by filtering indicates the metals are associated with suspended solids and not dissolved in the groundwater. The concentrations of aluminum, iron, and manganese in the wastewater discharged to the INTEC New Percolation Ponds are considerably lower than the concentrations in these three wells. Therefore, the concentrations of aluminum, iron, and manganese in the wastewater are not considered to be the source of these three metals. A possible source of these metals in the suspended solids is from the natural interbed sediments.

Because of these persistently high concentrations, several investigative and corrective actions were taken. These investigations and corrective actions include evaluating data from the service waste system effluent and previous well sampling events, performing additional development of wells ICPP-MON-A-167, ICPP-MON-A-166, and ICPP-MON-V-200 prior to the April 2004 sampling, performing additional video logging of well ICPP-MON-A-166 during August 2004, and adding additional sand gravel pack to well ICPP-MON-A-166 prior to the October 2004 sampling. Future sampling events will determine whether these corrective actions have been effective.

INTEC Sewage Treatment Plant

Similar to previous years, chloride and nitrate concentrations in April and October 2004 were slightly elevated in the aquifer compliance well (USGS-52) as compared to the facility background upgradient well (USGS-121), and concentrations were largely nondetectable for the remaining analytical parameters.

One perched water surveillance well (ICPP-MON-PW-024) is used as an indicator of soil treatment efficiency rather than as a point of compliance. As in previous years, total dissolved solids and chloride in the perched water approximate that of the Sewage Treatment Plant (STP) effluent. In both April and October 2004, the total dissolved solids concentrations were above the secondary constituent standard of 500 mg/L. The concentration of nitrate in April 2004 from the perched water surveillance well exceeded the primary constituent standard of 10 mg/L; the concentration in this well in October 2004 was slightly below 10 mg/L.

Fecal and total coliform samples were initially collected in April 2004 from the three INTEC STP WLAP wells. However, due to quality control issues associated with the fecal and total coliform analyses, the three wells were resampled in July 2004. Both fecal and total coliform were detected in July and October 2004 in well ICPP-MON-PW-024. The total coliform concentration in this well was above the primary constituent standard of 1 colony/100 mL. The treatment processes at the INTEC STP do not include disinfection of the wastewater, and the probable source of coliform bacteria found in the perched water well is the INTEC STP effluent. No coliform was detected in the aquifer wells associated with the INTEC STP.

No other primary or secondary constituent standards were exceeded in any of the permit-required wells sampled.

The INTEC STP Upgrade Project to combine the STP effluent with the service waste system wastewater, initiated in 2003 because the total nitrogen limit in the effluent could not be maintained below the permit limit, was completed in 2004. With the termination of the INTEC STP permit on December 2, 2004, the wastewater will no longer be discharged to the INTEC STP infiltration trenches, and the monitoring wells associated with the INTEC STP permit will no longer require monitoring.

Because discharges to the rapid infiltration trenches were discontinued in December 2004, the perched water zone in which ICPP-MON-PW-024 is located is expected to dry up. When well ICPP-MON-PW-024 was sampled in October 2004, the depth to water was 59.43 ft. The depth was checked again in December 2004, and was 64 ft. This indicates that the perched water near this well is quickly percolating down through the soil and that this particular perched water zone should no longer exist now that the discharge of effluent from the INTEC STP has been discontinued.

Test Area North/Technical Support Facility Sewage Treatment Plant

Per the Wastewater Land Application Permit, three monitoring wells are used as points of compliance for the Test Area North/Technical Support Facility Sewage Treatment Plant: TANT-MON-A-002, TAN-10A, and TAN-13A. Well TANT-MON-A-001 is identified as the background aquifer well.

Fecal and total coliform samples were initially collected in April 2004 from the four Test Area North/Technical Support Facility Sewage Treatment Plant monitoring wells as required by the Wastewater Land Application Permit. However, due to quality control

issues associated with the fecal and total coliform analyses, the four wells were resampled in July 2004. No fecal or total coliform were detected in any of the wells in either the July 2004 or the October 2004 samples.

Secondary constituent standards were exceeded in April (iron) and October (iron, manganese, and total dissolved solids) 2004 in samples taken from well TAN-10A, a compliance point. Elevated iron concentrations, greater than the secondary constituent standard of 0.3 mg/L, have historically been detected in this well and are believed to be influenced by the condition of the well casing, coupled with the residual effects of replacing the galvanized riser pipes in late 2002. Video logging performed on well TAN-10A in 2003 showed the carbon steel well casing was corroded most of the way to the water table, and iron concentrations in this well increased after the well maintenance was performed. Well TAN-10A continues to have intermittent problems meeting the total dissolved solids of 500 mg/L. The April 2004 total dissolved solids concentration in well TAN-10A was below the secondary constituent standard, but the October 2004 concentration (501 mg/L) slightly exceeded the secondary constituent standard. The condition of the well casing may be contributing to the total dissolved solids concentrations in well TAN-10A. In addition, the total dissolved solids in the effluent also appear to be impacting the concentrations in well TAN-10A.

For well TAN-10A, manganese was above the SCS of 0.05 mg/L in October 2004. The October 2004 manganese concentration was significantly higher than in the April 2004 sample and both April and October 2003 samples. This is the first time since the original permit was issued that the manganese concentration in this well has exceeded the groundwater quality standard, and no cause for the exceedance has been identified. It is possible that the high manganese result is an anomaly from the analytical process. Manganese in well TAN-10A will continue to be monitored semiannually, and future groundwater quality standard exceedances will be investigated.

No other primary or secondary constituent standards were exceeded in any of the permit-required wells sampled.